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Review Paper on Energy Generation by Using Piezoelectric Transducer

***Nehal Nawkhare*[1]**
Nishant Ade[2], Prof Sandeep Kale3
Department of Electrical Engineering, DBACER, Nagpur
[1]nawkhare27@gmail.com[2]nishanthirasingade@gmail.com[3]sandeep_kale2005@yahoo.co.in

Abstract

Many of the researches are going on for finding new type of energy resources as the wind, thermal, hydel, nuclear power are used in a big amount but some of these types of power affect the ecosystem as in thermal power plant large amount of emission of harmful gases & emission of radiation in nuclear power plant, where the other type such as wind and tidal energy depends upon type pressure and flow of wind that's why their energy cannot be considered as a constant source of energy for this we are presenting here a paper on foot step energy generation using Piezoelectric tiles. Here in this paper we generate the energy which is totally based on human footsteps their weight and pressure of foot with the area of cross section (area of impact). This paper relates the generation with help of multiple pieces of micro-fibre composite (MFC) piezoelectric transducer to convert that connection into a single tile so that it can add up the current as per the requirement in series connection and voltage in parallel connection. The tiles will be made with dimension of 1x1 meter, in that one row of piezieo is connected in series and two rows in parallel and also spring is provided as energy absorber. Rating of each piezoelectric transducer is 5V and tile rating is 10-12 V as it totally depends upon pressure.

Keywords *- piezoelectric tiles; transducer; pressure; generation*

INTRODUCTION

At present electricity has become very important source for living our life and culture. New technology requires a huge amount of electrical energy for its every bit of a process for its operation. Due to generation of electricity a huge amount of pollution is also getting created with it as from burning of fuel fumes etc. that's why a new way is open and introduced to find different method of generation of electricity in dad to day life. The concept of footstep energy conversion is a very efficient energy conversion method of converting the human weight their pressure, their movement or while they are walking is used to that pressure into Electricity. The actual electro-kinetic floor is really an approach to make electrical energy by using the kinetic energy of a person who walks on the floor. The energy that is usually produced by the floor which can make the environment sound without any pollution such kind of energy will cost effective indeed the power floor does no longer want any gasoline or any type of electricity source best by using the use of the kinetic power which primarily based on the character weight who moves at the ground. regarding this contemporary international in recent times strength and power are the simple key factors as the power demand is increasing every day so last answers of renewable energy are implemented. So this paper is a general review paper of piezoelectric tile which we working as a project.

RESEARCH ELABORATION

A. STUDY OF PIEZO MATERIALS-

The piezoelectric transducers work on the precept of piezoelectric effect. While

mechanical stress or forces are implemented to a few materials along sure planes, they produce electric voltage. This electric powered voltage may be measured effortlessly by way of the voltage measuring contraptions, which may be used to measure the pressure or force. The physical quantities like strain and force cannot be measured without delay. In such instances the material displaying piezoelectric transducers can be used. The strain or the force that needs to be measured is carried out along sure planes to those substances. The voltage output acquired from those substances because of piezoelectric impact is proportional to the implemented pressure or force. The output voltage may be calibrated towards the applied pressure or the pressure so that the measured cost of the output voltage at once offers the fee of the carried out pressure or pressure. In fact the dimensions can be marked at once in terms of strain or pressure to provide the values at once. The voltage output acquired from the substances because of piezoelectric effect could be very small and it has excessive impedance. To degree the output a few amplifiers, auxiliary circuit and the connecting cables are required.

B. MATERIALS USED FOR THE PIEZOELECTRIC TRANSDUCERS-

there are numerous materials that showcase piezoelectric impact as stated above. The substances used for the size purpose need to posses applicable properties like stability, high output, insensitive to the extreme temperature and humidity and potential to be fashioned or machined into any shape. But none of the materials exhibiting piezoelectric impact possesses all of the houses. Quartz, which is a herbal crystal, is fairly solid however the output acquired from it is very small. It additionally offers the advantage of measuring very slowly various parameter as they've very low leakage whilst they're used with excessive enter impedance amplifiers.

C. ACRYLITE ACRYLIC SHEET-

ACRYLITE acrylic sheet is a remarkably flexible cloth. it is robust, light-weight, and transparent. Use it to update glass in windows and partitions. it could be colored, textured, and is straightforward to paintings ACRYLITE acrylic sheet is offered in several versions: ACRYLITE GP® cellular cast acrylic sheet is to be had in extra than 200 colors, thicknesses ranging from 0.060" to 2.0" (1.five mm to forty eight mm) and in sheet sizes from 36" x forty eight" (900 mm x 1200 mm) to 72" x one hundred twenty" (1800 mm x 3000 mm).

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D. Battery-

A battery converts chemical energy into electrical electricity by using a chemical reaction. Typically the chemical substances are saved in the battery. it is utilized in a circuit to energy different components. A battery produces direct cutting-edge (DC) power (power that flows in a single course, and does not transfer from side to side).using the energy from an outlet in a building is inexpensive and greater efficient, however a battery can provide energy in areas that don't have electric electricity distribution. it is also useful for things that pass, together with electric automobiles and cell phones.

Batteries may be primary or secondary. The number one is thrown away while it could not provide strength. The secondary can be recharged and reused.

E.LED-

A light-emitting diode (LED) is a semiconductor device that emits seen light when an electric powered modern passes via it. The light isn't always specifically bright, but in maximum LEDs it is monochromatic, going on at a single wavelength. The output from an LED can range from red (at a wavelength of about seven-hundred nanometers) to blue-violet (approximately four hundred nanometers). Some LEDs emit infrared (IR) energy (830 nanometers or longer); this type of device is called an infrared-emitting diode (IRED). An LED or IRED consists of two elements of processed fabric referred to as P-type semiconductors and N-type semiconductors. those elements are located in direct touch, forming a place referred to as the P-N junction. in this recognize, the LED or IRED resembles most different diode types, but there are important variations. The LED or IRED has a transparent package, permitting visible or IR electricity to bypass through additionally, the LED or IRED has a big PN-junction area whose shape is customized to the application

F.LOAD-

Fan

A fan is a machine used to create drift within a fluid, generally a fuel inclusive of air. The fan consists of a rotating association of vanes or blades which act on the fluid. The rotating meeting of blades and hub is known as an impeller, a rotor, or a runner. typically, it's miles contained inside some shape of housing or case. this can direct the airflow or boom protection by means of stopping gadgets from contacting the fan blades. maximum enthusiasts are powered by using electric automobiles

HARDWARE IMPLEMENTATION

The hleng set up is as shown in figure 5. A tile made up of wooden base of 12mm on which foam sheet of 3mm is placed to protect the piezoelectric material from damage. On foam sheet 29 piezoelectric transducer is connected in series and parallel combination. To avoid excessive pressure directly on piezo material springs are implemented between the top and base of tile. The top is made up of fiber sheet of 2mm on which the pressure is applied. The fiber is bolted to the wooden base. The tile is of 1*1m. The storage battery is connected below the fiber sheet. Then voltage generated across a piezoelectric tile is supplied to a storage battery to recharge and supply the dc loads.

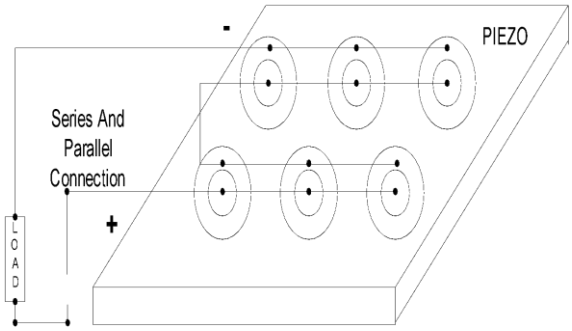

Fig 6: *Hardware setup*

Working

The working principle of piezoelectric tiles is a follows. When a load is applied to the tile surface it moves in the downward direction. The projections on the tile surface come in contact with the piezo material.

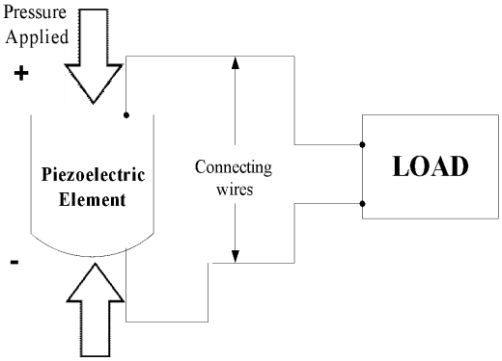

Fig 7: *Block Diagram*

The applied force produces stresses inner piezo cloth on the way to produce energy. there's clearance in among the springs and tile floor in an effort to provide loose deflection. The spring is provided for stability in addition to defensive the piezo material from getting broken by using an extra load applied.

The base plate is fitted inside the frame firmly to provide support to the piezo material while compression.

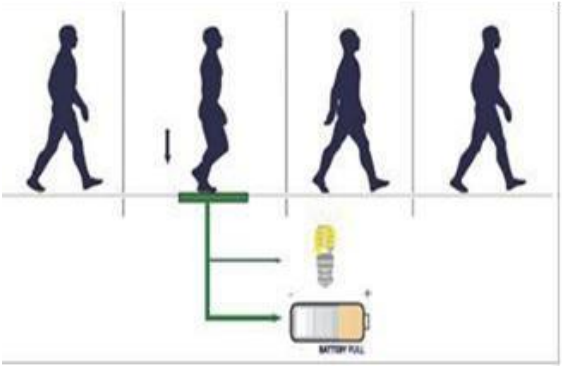

Fig 8: *Schematic representation of the working model*

The energy generated depends upon the weight of the person, type of movement, and maximum deflection. This kinetic energy is converted into electricity. This generated electricity is stored in the form of batteries.to which the rectifier is connected to get pure dc supply. It is observed that the voltage generated from one tile containing 29 piezoelectric transducers can generate up to 12V and current up to 1.5µA instantly.

ANALYSIS DONE ON THE PIEZO TILE

People whose weight which is varying from 40kg to seventy five kg have been made to walk on the piezoelectric tile to test the voltage producing ability of the Piezo tile. The relation between the load of the individual and strength generated is plotted in parent 9. From the graph, it could be visible that, the maximum voltage is generated when most weight/pressure is applied. Therefore, the peak voltage of 12V is generated across the tile when a weight of 75 Kg is implemented at the tile.

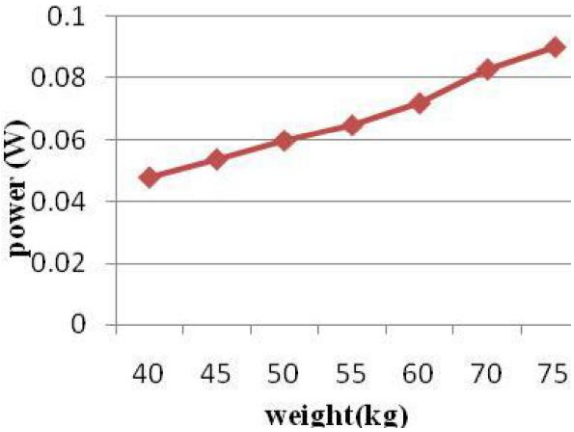

Fig 9: *Weight V/s power graph of piezo tile*

develop an interest in this technology to harvest electricity from the movement of cars and other vehicles.

CONCLUSION

A piezo tile capable of generating 12V has been devised. evaluation between various piezoelectric fabric shows that PZT is superior in characteristics. also, via contrast, it become set up that collection-parallel combination connection is extra appropriate. the load which is carried out to the piezoelectric tile and corresponding voltage generated is studied and they're observed to have a linear relation. It is especially suited for implementation in crowded areas. This can be used in street lighting without the use of long power lines. It can also be used as charging ports, a lighting of pavement side buildings. Piezoelectric flooring is ideal for places that receive heavy foot traffic. It can be placed at tourist attractions, dance floors or town halls, schools, stadiums,In fact, the tough power flooring has a product referred to as the Sustainable Dance floor specially designed for golf equipment. Piezoelectric tiles can also be placed in other busy locations consisting of subway stations, airports, universities, and shops.

The generation of using piezoelectric tiles to generate power using stress is new; corporations on this sector are nevertheless looking for project capitalists and investors. It'd be interesting to see if any automotive companies

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